



Preventing the Spread of Quagga and Zebra Mussels

A Time for Action

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Tribal Advisory Committee Meeting

CALIFORNIA DEPARTMENT OF
Fish and Wildlife





Presentation Overview

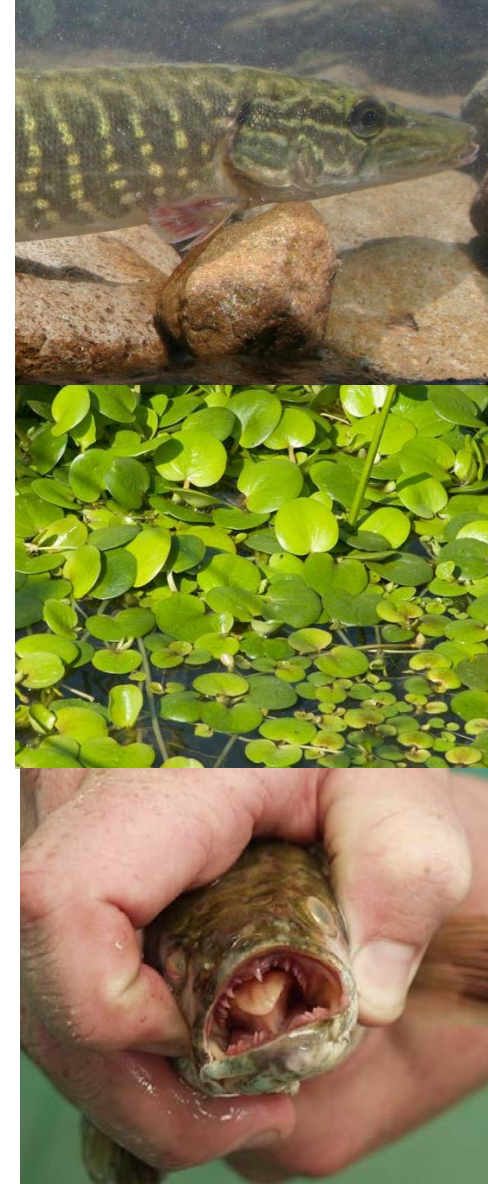
- I. Invasive Species Background
- II. Quagga and Zebra Mussels
- III. Prevention Program Elements
- IV. Next Steps Discussion

Invasive Species

An Overview



- **Invasive Species** – “a species that is non-native to the ecosystem under consideration, and whose introduction causes, or is likely to cause economic or environmental harm, or harm to human health.” (National Invasive Species Council)
- **Non-Native or Nonindigenous** – only refers to the origin of the species and not their rate of reproduction, dispersal, or potential to cause harm.
- **Vector/Pathway** – the means or agents that transport species from one place to the next



Invasive Species Federal Authority



- Lacey Act
 - Injurious Wildlife List
- Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990
 - AIS Management Plans
- National Invasive Species Act
 - Aquatic Species Nuisance Task Force
 - Regional Panels
- Executive Order on Invasive Species
 - National Invasive Species Council
 - Invasive Species Advisory Council



Burmese python (Python molurus bivittatus) Susan Jewell, USFWS

Invasive Species State Authority



- Department of Fish and Wildlife
 - Live wild animals and plants
 - Aquaculture operations
- Department of Food and Agriculture
 - Injurious animal pests, plant diseases, and noxious weeds
- State Water Resources Control Board
 - Biological pollutants
- Department of Boating and Waterways
 - Aquatic weeds
- State Lands Commission
 - Ballast water

Quagga and Zebra Mussels

An Overview



- Freshwater bivalve native to Ukraine and Russia
- Small, banded or solid color pattern
- Prolific: 1 million eggs/spawning season
- Free-floating larval stage (veligers)
- Transportable
- Arrived in the U.S. in late 1980's via ballast water



Quagga and Zebra Mussels

Impacts



Ecological Impacts

- Disrupts the food web
- Changes water quality
- Out-competes with other species



Water Supply Impacts

- Pipe fouling
- Trash racks
- Infrastructure



Quagga and Zebra Mussels

Impacts



Fishing Impacts

- Waterbody closures
- Reduction in game fish
- Fishery collapse



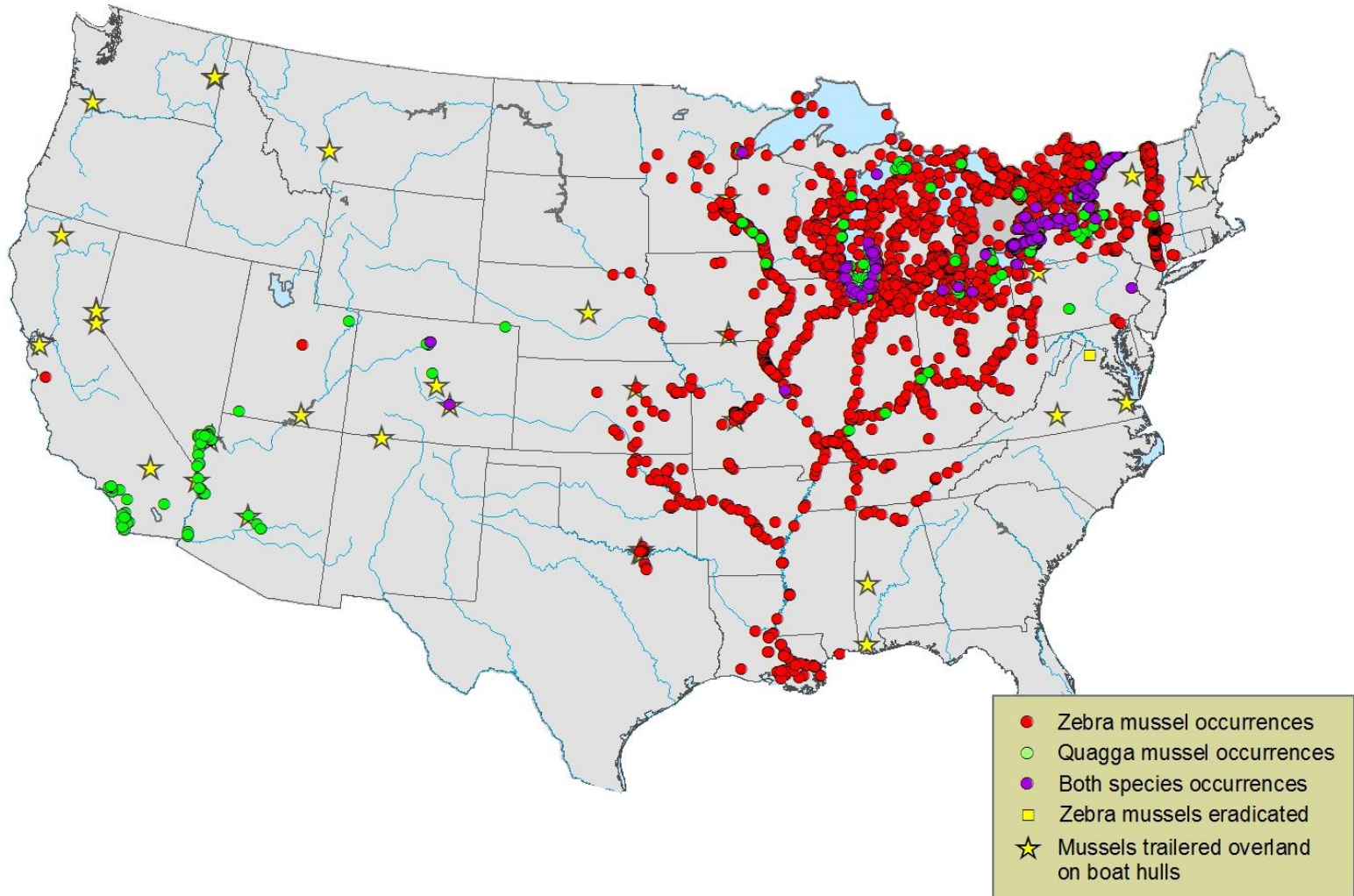
Boating Impacts

- Block cooling system
- Increase drag on bottom of boat
- Affect steering equipment



Quagga and Zebra Mussels

U.S. Infestation



Quagga and Zebra Mussels

CA Infestation



Quagga Mussel

Jan 07	Colorado River
Mar 07	San Bernardino Co.
Jul 07	Riverside Co.
Aug 07	San Diego Co.
Feb 08	Imperial Co.
Apr 08	Orange Co.

Zebra Mussel

Jan 08	San Benito Co.
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Invasive Species

Fish and Wildlife Statutory Authority



Quagga and Zebra Mussel Authority

- Fish and Game Code Section 2301
 - Inspection authority
 - Quarantine authority
 - Control Plans
- Fish and Game Code Section 2302
 - Prevention Programs
- California Code of Regulations
 - Restricted Species List – Title 14, Section 671



Zebra Mussels (Dreissena polymorpha) - USFWS Photo

Prevention Programs

FGC § 2302



Quagga and Zebra Mussel Prevention

- Program Elements
 - Vulnerability Assessment
 - Monitoring
 - Public Education
 - Management of Recreation

DON'T MOVE A MUSSEL!

Quagga/zebra
mussels

ruin boats and destroy waters

DON'T LET THEM RIDE WITH YOU!

Prevention Programs

Vulnerability Assessment



Risk Factors

- Recreational use
 - Boating
 - Fishing/tournaments
- Water access
 - Marinas
 - Number of boat ramps
- Nearby infestations



Prevention Programs

Vulnerability Assessment



Risk Factors

- Water Quality

Parameter	No Adult Survival	Uncertain Adult Survival	Moderate Infestation	High Infestation
Calcium (mg/L)	<8 to <10	<15	16-24	≥ 24
pH	<7.0 or >9.5	7.1-7.5 or 9.0-9.5	7.5-8.0 or 8.8-9.0	8.2-8.8
Mean Summer Temp (°F)	<64	64-68 or >83	68-72 or 77-83	72-75
Dissolve Oxygen (mg/L)	<3	5-7	7-8	≥ 8
Salinity (mg/L)	>10	8-10	5-10	<5

Table 1. Criteria used in determining the levels of infestation (Mackie and Claudi 2010).

Prevention Programs Monitoring



- Early Detection Monitoring
 - Visual Surveys
 - Substrates
 - Plankton Tows
- Sample Analysis and Identification
 - UC Davis Bodega Marine Laboratory
- Decontamination
 - Protocols



Strategy Objectives: Public Education



Posters and Rack Cards

THE MUSSELS ARE HERE!
What you can't see will ruin your boat

DON'T MOVE A MUSSEL!

Mussels will ruin your boat, fisheries and California waters!

When leaving the water:

- **Inspect** all exposed surfaces - small mussels feel like sandpaper to the touch.
- **Wash** the hull of each watercraft thoroughly.
- **Remove** all plants and animal material.
- **Drain** all water and **dry** all areas.
- **Drain** and **dry** the lower outboard unit.
- **Clean** and **dry** all live-wells.
- **Empty** and **dry** any buckets.
- **Dispose** of all bait in the trash.
- **Wait** 5 days in hot weather and up to 30 days when cool and moist. Keep watercraft dry between launches into different fresh waters.

REPORT MUSSEL FINDS TO 866-440-9530
VISIT www.dfg.ca.gov/invasives/quaggamusel

LOOK FOR MUSSELS HERE

CHECK YOUR BOAT, TRAILER AND VEHICLE

DON'T MOVE A MUSSEL!
Clean, drain, dry boat.
Dispose of live bait
Dry 5 days in hot weather & up to 30 days when cool and moist.
Protect your boat, fisheries and California waters!
MUSSEL HOTLINE 866-440-9530
www.dfg.ca.gov/invasives/quaggamusel

This...

Microscopic

Smartphone scan for more information.

DON'T MOVE A MUSSEL!

Quagga/zebra mussels
ruin boats and destroy waters

DON'T LET THEM RIDE WITH YOU!

Watercraft and equipment can move quagga and zebra mussels from infested waterbodies to uninfested waterbodies. If spread, these mussels can:

- Encrust boat hulls, clog cooling system, steering equipment.
- Alter aquatic ecosystems, resulting in native species and sportfish.
- Litter beaches with sharp, foul smelling shells.
- Clog water distribution systems, result in higher utility bills.

DON'T SPREAD INVASIVE SPECIES

You can prevent the spread of quagga and zebra mussels using this checklist every time you exit a waterbody:

- ☒ **Inspect** all watercraft and equipment
- ☒ **Clean** any visible mud, plants, fish or animals from watercraft and equipment
- ☒ **Drain** all water, including from lower outboard unit, ballast, live-well, buckets, etc.
- ☒ **Dry** all areas
- ☒ **Dispose** of debris and live bait in the trash

YOU CAN STOP THEM!
For more information
866-440-9530
www.dfg.ca.gov/invasives/quaggamusel

STOP AQUATIC HITCHHIKERS!
Prevent the spread of invasive species.
Clean all watercraft and equipment.
www.ProtectOurWaters.net

Smartphone scan for more information.

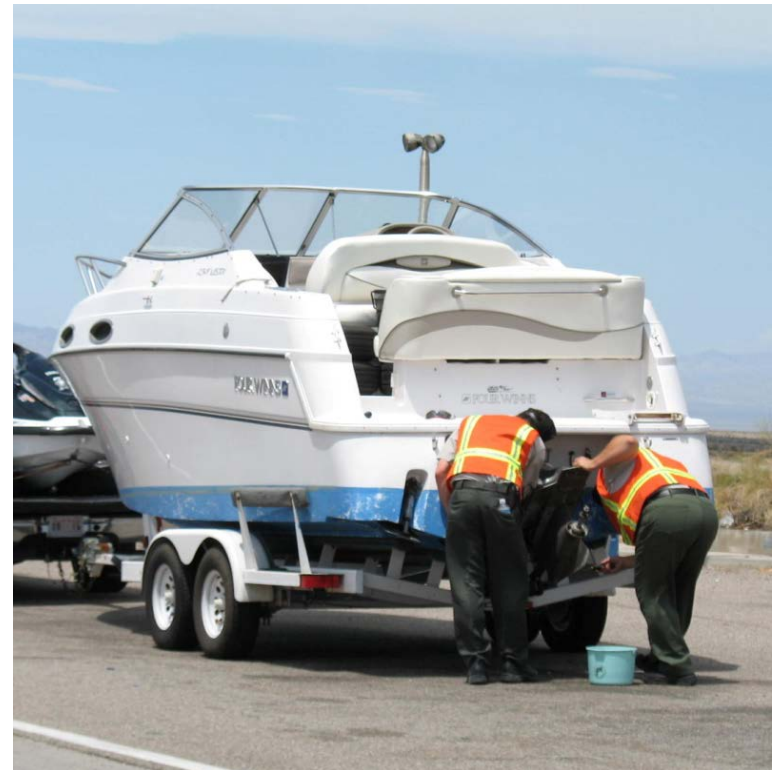
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Prevention Programs

Recreational Activities



- Uniform Minimum Protocols
 - Levels I, II, III
- Trainings
 - Watercraft Inspection Trainings Level I and II



Prevention Programs Funding



- Local Ordinances/MOU
 - Set up fee structure
- Grants
 - Wildlife Conservation Board
 - USDA
- AB 2443 – New Legislation



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<http://www.dfg.ca.gov/invasives/quaggamussel/>

Next Steps Discussion



- CDFW Resources
- Tribal Needs
- Cultural Impacts
- Co-Managed Lands